CHAPTER 1

Introduction

Description

The PCL-743 and PCL-745 series cards each provide two RS-422/485 serial ports. Each port has a 16C550 UART with an on-chip 16-byte FIFO buffer for reliable high-speed serial I/O. The UART buffers data into 16-byte packets before putting it on the bus. This drastically reduces the CPU's load and avoids data loss when the system is busy and cannot process the interrupt quickly, which is especially useful for high speed serial I/O under Windows.

The PCL-745B/745S cards differ from the PCL-743B/743S cards in that they utilize on-board optical isolators to protect your PC and equipment against damage from ground loops, increasing system reliability in harsh environments. In order to meet the demand for reliability, the PCL-743S/745S introduces surge protection technology. This surge protection can prevent damage from abrupt high voltage (2000 V_{DC}) sources such as lightning power line strikes.

These cards include the PC-ComLIB communication software package. This package consists of a configurable DOS driver, a programming library that supports most common languages (including C, Pascal, Visual Basic, assembly and Clipper), and DataScope. DataScope is a data viewer and terminal emulator with self-diagnostics utilities for easy troubleshooting and debugging.

An RS-485 network with automatic data flow control using RS-232 software

In RS-485 mode the cards automatically sense the direction of incoming data and switch transmission direction accordingly. This feature means your network looks and acts just like an RS-232 network. Application software written for half duplex RS-232 can be used without modification. Moreover, you can simply and quickly build an RS-485 network with just two wires.

Features

- Two independent RS-422/RS-485 serial ports
- Provides 500 V_{DC} isolation (PCL-745B/745S only)
- Provides 2000 V_{DC} surge protection (PCL-743S/745S only)
- 16C550 UARTs with on-chip 16-byte FIFO
- Transmission speeds up to 115 Kbps
- I/O address and interrupt selectable
- Wide IRQ selection: 3, 4, 5, 6, 7, 9, 10, 11, 12 or 15
- Supports 2-wire or 4-wire operation
- Supports Tx, Rx, RTS and CTS signals
- Automatic RS-485 data flow control
- Space reserved for terminator resistors
- Space reserved for optional surge protection on data lines
- Supports standard DOS COM1, COM2, COM3 and COM4 ports
- Includes PC-ComLIB Driver

Specifications

- **Ports**: 2
- **UART**: 2 x 16C550 with 16 byte FIFO
- **Signals supported**:
  RS-422: TxD+, TxD-, RxD+, RxD-, RTS+, RTS-, CTS+, CTS-, and GND
  RS-485: DATA+, DATA-, and GND
- **I/O addresses**: From 200H to 3FFH
- **IRQ**: 3, 4, 5, 6, 7, 9, 10, 11, 12 or 15
- **Surge protection**: 2000 V_{DC} (PCL-743S/745S only)
- **Isolation Voltage**: 500 V_{DC} (PCL-745B/745S only)
- **Power consumption**: +5 V @ 400 mA typical, 950 mA max.

- **Connectors**: Dual DB-9 male connectors
- **Operating temperature**: 32 to 140° F (0 to 60° C) (refer to IEC 68-12-1.2.3)
- **Dimensions**: 7.3" x 3.9" (185 mm x 100 mm)
- **Storage temperature**: -13 ~ 176° F (-25 ~ 80° C) (only for card)
- **MTBF**:
  PCL-745B/745S: over 122,264 hrs at 25° C, Ground-fix environment
  PCL-743B/743S: over 251,319 hrs at 25° C, Ground-fix environment

Applications

- PLC monitoring and control
- Serial communication interface for harsh environments
- Data entry terminal
- Remote data acquisition and control systems
- Instrument controller and distributed control systems

CHAPTER 2

Hardware Configuration

Initial Inspection

You should find the following items inside the shipping package (in addition to this manual):

- PCL-743B or 745B, or 743S, or 745S interface card
- PC-ComLIB diskette
- PC-ComLIB user's manual

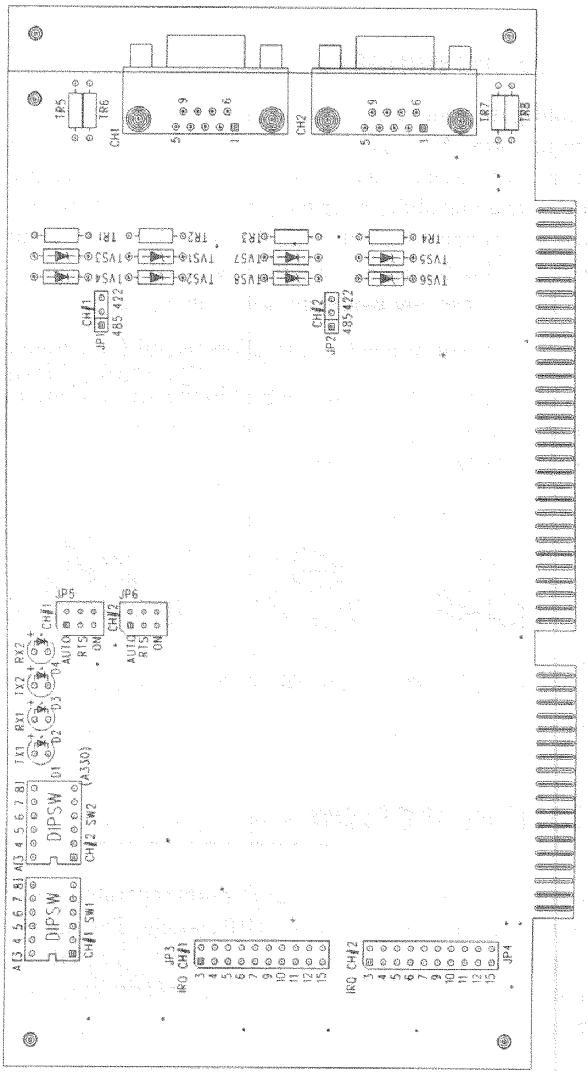
We carefully inspected the PCL-743/745 series mechanically and electrically before we shipped it. It should be free of marks and scratches and in perfect working order on receipt.

As you unpack the PCL-743/745 series, check it for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or it fails to meet specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection we will make arrangements to repair or replace the unit.

When you handle the PCL-743/745 series, remove it from its protective packaging by grasping the rear metal panel. Keep the anti-vibration packing. Whenever you remove the card from the PC, store it in this package for protection.

Warning! *Discharge your body's static electric charge by touching the back of the grounded chassis of the system unit (metal) before handling the board. You should avoid contact with materials that hold a static charge such as plastic, vinyl and styrofoam. Handle the board only by its edges to avoid static damage to its integrated circuits. Avoid touching the exposed circuit connectors. We also recommend that you use a grounded wrist strap and place the card on a static dissipative mat whenever you work with it.*

Jumper and Switch Locations



Jumper settings

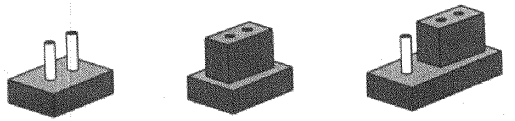
This section tells how to set the jumpers to configure your card. It gives the card default configuration and your options for each jumper.

How to set jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.

You may find pair of needle-nose pliers useful for setting the jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.



Open **Closed** **Closed 2-3**

Card Configuration

You can configure each of the card's ports separately. Each port has two jumpers and one six-position DIP switch. The jumpers set the port's protocol (RS-422 or RS-485) and IRQ. The DIP switch sets the port base I/O address. The following chart shows the function of each jumper and switch:

Switch and jumper functions
RS-422 or RS-485
JP1Port 1
JP2Port 2
Port IRQ
JP3Port 1
JP4Port 2
Port I/O address
SW1 Port 1
SW2 Port 2

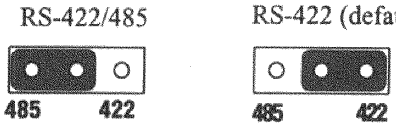
See page 7 for jumper and DIP switch locations

Default Settings

When the board comes from the factory, both ports are set for RS-422. Port 1 is set for DOS COM1 (IRQ = 4, base I/O address = 3F8), and Port 2 is set for DOS COM2 (IRQ = 3, base I/O address = 2F8). If you need to change these settings, see the following sections. Otherwise, you can simply install the card. Note that you will need to disable your CPU card's on-board COM ports if any, or set them to alternate addresses / IRQs.

RS-422/485 selection (JP1 and JP2)

You can set each port individually for either RS-422 (the default) or RS-485 operation. Jumper JP1 configures Port 1, and JP2 configures Port 2. The figure below shows the jumper settings. See the figure on page 7 for help locating the jumpers.



I/O base address (SW1 and SW2)

You set the port base addresses using two six-position DIP switches, one for each port. Switch SW1 sets Port 1, and SW2 sets Port 2. You can choose base addresses from hex 200 to 3FF. The default settings are COM1 (hex 3F8) for Port 1, and COM2 (hex 2F8) for Port 2, as shown below:

SW1: CH#1
Base address: 3F8

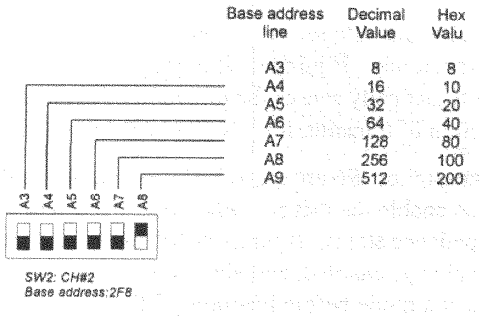
SW2: CH#2
Base address: 2F8

The following table shows the switch settings for various base addresses:

Port base address (SW1 or SW2)						
Base address	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**
200-207	●	●	●	●	●	●
208-20F	○	●	●	●	●	●
2E8-2EF	○	●	○	○	○	●
*2F8-2EF (COM2)	○	○	○	○	○	●
3E8-3EF	○	●	○	○	○	○
*3F8-3FF (COM1)	○	○	○	○	○	○

○ = Off ● = On * = default

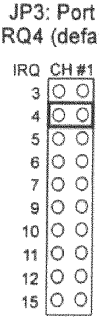
The following example shows how to set the base address to 2F8, the default setting for COM2: The switch sum is set to 2F8 = 200 + 80 + 40 + 20 + 10 + 8, (HEX).

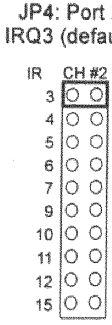


NOTE: *On the PCL-743/745 series, address line A9 does not appear on the DIP switch, as it is permanently hard-wired to hex 200.*

Interrupt level (IRQ) setting (JP3 and JP4)

Jumpers JP3 and JP4 set the interrupt for each port. You can choose any IRQ from 3 to 15 except for 6, 8, 13, and 14. JP3 sets Port 1 and JP4 sets Port 2. If you want to use the card as COM1 and COM2, you must set Port 1 for IRQ4 and Port 2 for IRQ3 (the default settings). If you choose different IRQ's, make sure they are not used by other cards in the system. The following figures show the card default settings:





Enable mode selection

Jumpers JP5 and JP6 set the driver enable mode selections of ports 1 and 2 respectively. If jumpers JP5 or JP6 are set at "AUTO," the driver automatically senses the direction of the data flow and switches the direction of transmission. No handshaking is necessary.

If jumpers JP5 or JP6 are set to RTS (request to send), a high RTS signal can enable the driver. Otherwise, the driver output remains in high impedance status. If jumpers JP5 or JP6 are set to "On," the driver is always enabled, and always in high or low status. The user must select a mode before beginning RS-422 applications.

Terminator resistor setup

You can install terminator resistors if necessary to match impedance. Each signal line (RTS, CTS) has a separate resistor. Resistors TR5 (for CTS) and TR6 (for RTS) are for port 1. Resistors TR7 (for CTS) and TR8 (for RTS) are for port 2.

Card installation

Warning! *Turn off your PC's power supply whenever you install or remove the PCL-743/745 or its cables. Static electricity can easily damage computer equipment. Ground yourself by touching the chassis of the computer (metal) before you touch any boards. See the static warning on page 6*

1. Turn off the computer. Turn the power off to any peripheral devices (such as printers and monitors).
2. Disconnect the power cord and any other cables from the back of the computer. Turn the PC if necessary to gain access to the cables.
3. Remove the PC's cover (refer to your user's guide if necessary).
4. Locate the expansion slots or passive backplane (at the rear of the PC) and choose any unused slot.
5. Remove the screw that secures the expansion slot cover to the PC (save the screw to secure the interface card retaining bracket). Remove the anti-vibration card clamp if supplied.
6. Carefully grasp the upper edge of the PCL-743/745 card. Align the hole in the retaining bracket with the hole on top of the expansion slot. Align the gold striped edge connector with the expansion slot socket. Press the board firmly into the socket.
7. Replace the screw in the expansion slot retaining bracket. Replace anti-vibration card holder.
8. Replace the PC's cover. Connect the cables you removed in step 2. Turn the computer power on.

The board is now installed in the computer. See Chapter 4 for information on cabling.